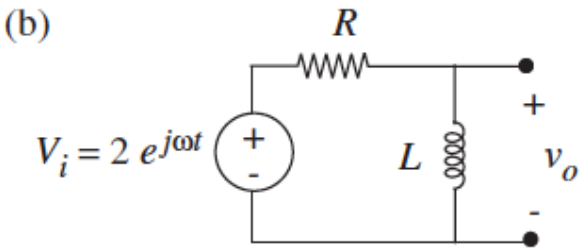
EE2210 Electric Circuits **Spring 2019**

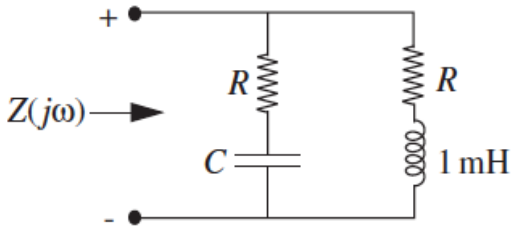
Practice problems for Lecture 11 – Lecture 13

Textbook: Foundations of Analog and Digital Electronic Circuits by Anant Agarwal and Jeffery H. Lang, 1st edition, Elsevier.

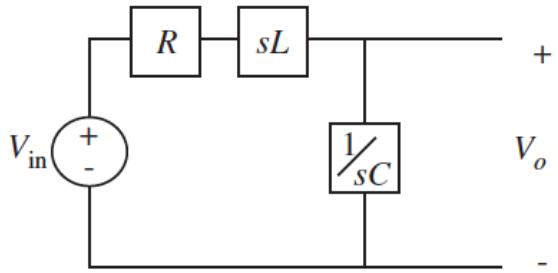
1. Write expressions for $H(j\omega) = V_o/V_i$, its magnitude $|H(j\omega)|$, and its phase angle $\angle H(j\omega)$, as a function of ω in the following figure.



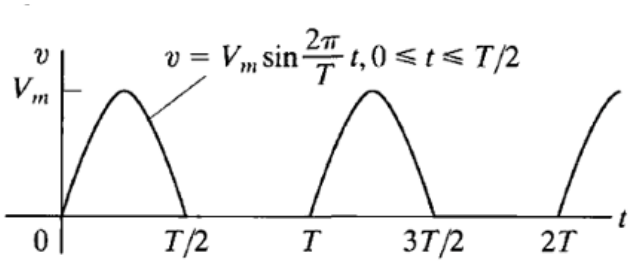
2. The impedance of the network shown in the following figure is found to be 2 kΩ and is purely real for all frequencies. The value of the inductor is 1 mH as shown. What are the values of *R* and *C*?



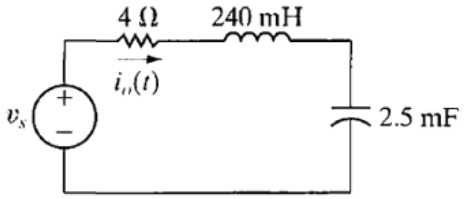
3. The circuit shown in the following figure has an input voltage $v_{in1}(t) = V_1\cos(120\pi t)$, and L = 500 mH, C = 80 μF, and R = 50 Ω. Compute the transfer function $H(s) = V_o(s)/V_{in1}(s)$.



4. Find the rms value of the half-wave rectified sinusoidal voltage shown.



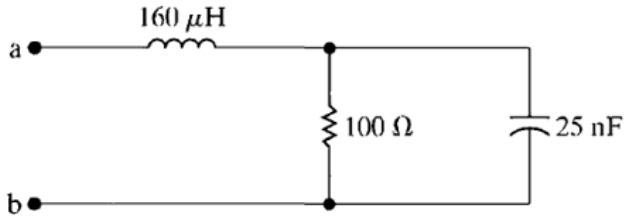
5. Find the steady-state expression for $i_0(t)$ in the circuit in the following figure if $v_s =$ 100sin50t mV.



6.

(a) For the circuit shown in the figure below, find the frequency (in radians per second) at which the impedance Z_{ab} is purely resistive.

(b) Find the value of Z_{ab} at the frequency of (a).



7. A resistor denoted as R_L is connected in parallel with the capacitor in the circuit in the following Figure 14.7.

   a) Derive the expression for the voltage transfer function $\frac{V_O}{V_i}$.

   b) At what frequency will the magnitude of $H(j\omega)$ be maximum?

   c) What is the maximum value of the magnitude of $H(j\omega)$?

   d) At what frequency will the magnitude of $H(j\omega)$ equal its maximum value divided by $\sqrt{2}$?

Figure P14.7